CLAIMS

I/We claim:

1. A system for actively controlling the suspension of a vehicle comprising:

a plurality of adjustable struts;

an actuator coupled to the plurality of struts to effectuate adjustment thereof;

a plurality of displacement sensors, each displacement sensor configured to measure a displacement of one strut of the plurality of struts and generate strut relative displacement signals based on the displacement measured;

a controller in electrical communication with the plurality of sensors, wherein the controller is configured to determine a first frequency amplitude for heave, pitch, or roll of the vehicle based on the strut relative displacement signals and to actuate the actuator based thereon to control and adjust the suspension of the vehicle.

2. The system according to claim 1, wherein the controller includes a derivative filter to generate a strut relative velocity based on the strut relative displacement signals.

3. The system according to claim 2, wherein the controller is configured to generate body relative velocity based on the strut relative velocity.

4. The system according to claim 2, wherein the controller is configured to calculate a body relative heave velocity using the relationship $V_h=(V_{lf}+V_{lr}+V_{rf}+V_{rr})/4$, where i=lf, lr, rf and rr; and $(V_{lf},V_{lr},V_{rf},V_{rr})$ is the strut relative velocity.

5. The system according to claim 2, wherein the controller is configured to calculate the body relative pitch velocity using the relationship $V_p=(V_{lf}-V_{lr}+V_{rf}-V_{rr})/(2*L)$, where i=lf, lr, rf and rr; L is the wheelbase; and $(V_{lf},V_{lr},V_{rf},V_{rr})$ is the strut relative velocity.

6. The system according to claim 2, wherein the controller is configured to calculate the body relative roll velocity using the relationship $V_r=(V_{lf}+V_{lr}-V_{rf}-V_{rr})/(2*t)$; where i=lf, lr, rf and rr; t is the tread; and $(V_{lf},V_{lr},V_{rf},V_{rr})$ is the strut relative velocity.

7. The system according to claim 1, wherein the controller is configured generate a body relative velocity based on the strut relative displacement signals.

8. The system according to claim 7, wherein the controller is configured to extract the first frequency amplitude based on the body relative velocity.

9. The system according to claim 8, wherein the controller is configured to apply a high pass filter to the body relative velocity before extracting the first frequency amplitude.

10. The system according to claim 7, wherein the controller is configured to extract a second frequency amplitude based on a body relative velocity.

11. The system according to claim 10, wherein the controller is configured to apply a low pass filter to the body relative velocity before extracting the second frequency amplitude.

12. The system according to claim 7, wherein the controller is configured to calculate an effective frequency based on the first and second frequency amplitudes.

13. The system according to claim 12, wherein the controller is configured to calculate an effective frequency based on the relationship A_1/A_0 ; where the first frequency amplitude is A_1 and the second frequency amplitude is A_0.

14. The system according to claim 12, wherein the controller is configured to calculate the desired heave strut pressure based on the strut relative displacement signals and the effective frequency.

15. The system according to claim 12, wherein the controller is configured to calculate the desired heave strut pressure based on strut relative velocity and the effective frequency.

16. The system according to claim 12, wherein the controller is configured to calculate the desired roll strut pressure based on strut relative velocity and the effective frequency.

17. The system according to claim 12, wherein the controller is configured to calculate the desired pitch strut pressure based on strut relative velocity and the effective frequency.

18. A method for actively controlling the suspension of a vehicle having adjustable struts and an actuator to adjust the struts, the method comprising:

sensing a relative strut displacement of the suspension;

calculating a strut relative velocity based on the strut relative displacement;

calculating a body relative velocity based on the strut relative velocity;

extracting a first frequency amplitude based on the body relative velocity; and

actuating the actuator based on the first frequency amplitude.

19. The method according to claim 18, further comprising extracting a second frequency amplitude based on the body relative velocity and actuating the actuator based on the second frequency amplitude.

20. The method according to claim 19, wherein the first frequency amplitude is calculated using a high-pass filter and the second frequency amplitude is calculated using a low-pass filter.

21. The method according to claim 19, further comprising calculating an effective frequency based on the relationship A_1/A_0 ; where the first frequency amplitude is A_1 and the second frequency amplitude is A_0.

22. The method according to claim 21, further comprising calculating a desired heave strut pressure based on the strut relative displacement signals and the effective frequency.

23. The method according to claim 21, further comprising calculating a desired heave strut pressure based on strut relative velocity and the effective frequency.

24. The method according to claim 21, further comprising calculating a desired roll strut pressure based on strut relative velocity and the effective frequency.

25. The method according to claim 21, further comprising calculating a desired pitch strut pressure based on the strut relative velocity and the effective frequency.

26. The method according to claim 18, wherein the strut relative velocity is calculated using a derivative filter.

27. The method according to claim 18, wherein the body relative velocity is calculated according to the relationship $V_h=(V_{lf}+V_{lr}+V_{rf}+V_{rr})/4$, $V_p=(V_{lf}-V_{lr}+V_{rf}-V_{rr})/(2*L)$, $V_r=(V_{lf}+V_{lr}-V_{rf}-V_{rr})/(2*t)$;

where V_h is the body relative heave velocity; V_p is the body relative pitch velocity; V_r is the body relative roll velocity; i=lf, lr, rf and rr; $(V_{lf},V_{lr},V_{rf},V_{rr})$ is the strut relative velocity; L is the wheelbase; and t is the tread.